ROCKS and MINERALS

A MAGAZINE FOR MINERALOGIST, GEOLOGIST AND COLLECTOR

PUBLISHED MONTHLY --- FOUNDED 1926

VOL. 10, No. 3 WHOLE No. 45

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Entered as second-class matter September 13, 1926, at the Post Office at Peekskill, N. Y., under the Act of March 3, 1879

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Specially written articles (as Contributions) are desired.

Subscription price $1.50 a year; foreign $1.75. Current numbers, 15c a copy. No responsibility is assumed for subscriptions paid to agents and it is best to remit directly to the Publisher.

Issued on the 1st day of each month.

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ROCKS and MINERALS

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The Official Journal of the Rocks and Minerals Association

MARCH 1935

VOL. 10, No. 3

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The Story of The Zinc Industry in The Saucon Valley

By RICHMOND E. MYERS, M.A.

PART TWO.

Reorganization and the Lehigh Zinc Company

An interesting anecdote is told in connection with this meeting of the directors by Mr. Wetherill's son, the late Samuel Wetherill Jr. "On the morning of this day my father was in New York. On his way to the train he noticed in the window of an art store on Broadway, a very nice picture which proved to be a copy in oil of Landseer's celebrated picture of a fox looking intently at a spring trap with a nice fresh dead rabbit caught in it. The fox had his tongue out and his attention said very plainly 'you will not catch me.' This picture was purchased by my father, and hung on the wall of the dining room. One of the directors noticed the picture and asked my father what it was. 'It is a copy of Landseer's, a picture I happened to see in New York this morning,' he replied, 'and brought it along home with me, for it appeared to me, gentlemen, to be very appropriate for this particular meeting'."

The meeting however accomplished nothing, and in a few days the zinc company was notified that the warehouses would not take any more oxide from them, as they did not consider it equal to the quality of the sample, and that the company must comply to the terms of their agreement. The matter was taken to court, and fought back and forth. In the end, it was settled by the purchase of the Gilbert and Wetherill interest in 1859 by the company. Mr. Gilbert returned to New York and later became associated with Mr. Goodyear in the rubber business. Mr. Wetherill remained in Bethlehem, and when the war broke out in 1861, he at once recruited a company of men from Bethlehem, drawing heavily on the men employed in the works, and organized the 11th Pennsylvania Cavalry. Off they went to war, with Mr. Wetherill their captain, and after four years service in the thick of things, Mr. Wetherill returned to Bethlehem with the title of Lieut. Col. But that is not the zinc business. To return to the change of 1859.

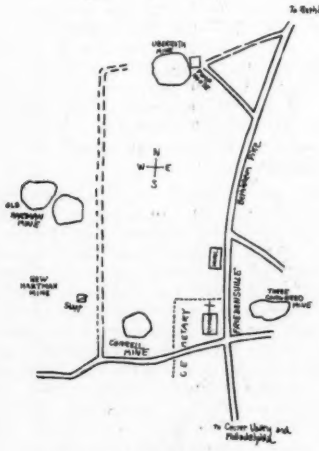
The plant itself at this time was leased from the company, by Mr. Joseph Wharton, who became the manager of the works, while the company still superintended the mines at Friedensville. In 1860 the corporate title of the company was changed to the Lehigh Zinc Co., and turned its attention to the production of spelter. Mr. Wharton contracted with the company for spelter manufacturing, and he secured a Belgian, Louis De Gee, to superintend this new departure. De Gee was a member of the firm of De Gee Gernant & Co. of Ougree in Bel-

gium, who had been producing the best spelter in Europe for some years. He understood the production thoroughly, and brought with him to Bethlehem, several Belgian workmen. These were Andre Setrixhe, Francois Lemall, and Jean Henrard, all experts in the production of spelter. There were four subsequent arrivals of Belgians; 15 in 1860, 9 in 1861, 6 in 1863, and 27 in 1864.

By the end of the war the company had purchased all of the mining property outright, except the property on which the mine known as the Correll mine was being worked. This they still leased, as they had from the time it was opened, from the Passaic Zinc Co., of New Jersey, who had leased it from its owner, and subleased it to the Lehigh Zinc Co. at very high rates and royalties. A mill had been erected for rolling sheet zinc, and was put up under the direction of Mr. Andrew Tripple, who had gone abroad to see how such mills were constructed in Belgium. The war years were years of profit in many ways to the company, and the close of the hostilities found them on a wave of prosperity.

The Mines at Friedensville

At this point it might be well to turn our attention to the mines at Friedensville. There are five in number, all



Plan of Mines in the Saucon Valley
(Not to Scale)

open pits, with exception of one. The open pit mines are today all partly filled with water. The largest of these is the Uberroth Mine, the first one worked. In none of the others did the ore continue to so great a depth. There are several very rich veins in this mine, and still a great deal of ore has been untouched, even in its open excavation. About a quarter of a mile to the south west of the Uberroth Mine, is the Old Hartman Mine, not so steep as the Uberroth opening, but with great quantities of ore nearer the surface. The Correll Mine lies about one-eighth of a mile S. E. of the Old Hartman, first worked in 1859, but not so abundant as the first two. Adjoining the Correll property to the west is the New Hartman Mine, the only one worked entirely underground, not very productive at any time. East of the Bethlehem Pike, opposite the Friedensville Church, is the Three Cornered Mine, very likely of the same vein from which the New Hartman and Correll Mines were dug. It was never a very productive enterprise, and had to be given up when it was seen that the diggings were undermining the church yard.

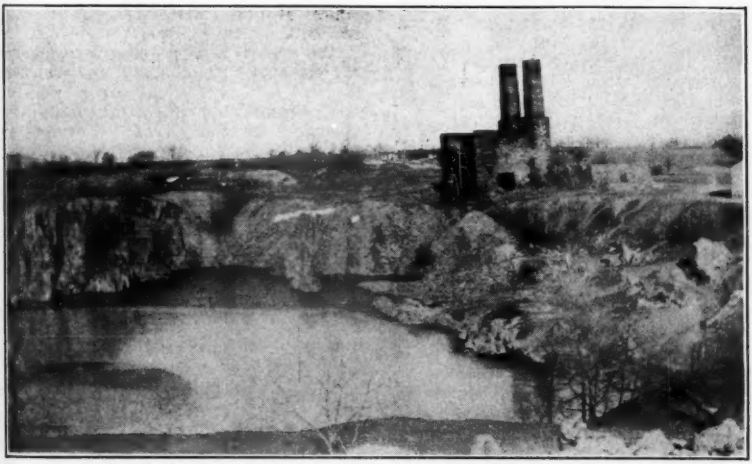
The Lehigh Zinc Company operated these mines from 1853 to 1876 unbrokenly. Up to 1875 they had no competition, but in that year their lease on the Correll Mine expired, and the new lease was obtained by the Bergen Point Zinc Co. in New Jersey, who began operations at once, and for a time two companies were in the Friedensville deposits.

When the mining operations were first commenced, inasmuch as a great deal of the ore was found on the surface, it was natural to begin with the open pit method. The first 100,000 tons of ore taken from the Uberroth Mine were removed in that manner. When the surface was all mined, the veins were followed downwards. Soon however, the open pits were given up entirely, due of course to the exhaustion of surface deposits, and also the falling of large masses of limestone from the sides into the pit, rendering the mining unsafe. Shafts were then sunk, and the ore was hoisted by bucket and rope method. In the Uberroth and Old Hartman Mine, the shafts were slanting, but in the other mines they were vertical, and the miners had to climb up and down on

ladders, as elevators were not then in common use in mining operations. The best description of the mines at this period can be found in the Bethlehem Times. A reporter from that paper was sent to Friedensville to cover the operations, and I submit herewith portions of his subsequent writeup.

"The gentlemanly superintendent, Mr. Pasco, gave us all the needed information before entering. Having been furnished with suitable clothing, lights, etc., we began our descent into the earth. The mines are believed to be inexhaustible, with a quantity of ore that surpasses very few regions of the world. This mine (the Uberroth Mine) has been worked for several years, and has reached the depth of 120 feet, undermining three acres of surface. Geological observations and comparisons with old European mines, indicate the ore continues to the depth of several hundred feet. As we reached the foot of the plane (shaft) above and around us towered boulders of limestone, between which are hewn out the veins of zinc. Different drifts lead hundreds of feet in every direction. The ore found here is mostly silicate of zinc though great masses of carbonate of zinc occur, both of most excellent quality. It exists in masses varying from thousands of tons to small veins, mingled with clays filling the large cavities and interstices of the dolomite or magnesian limestone, which is here the prevailing rock, also a sort of schist or slate is found in some places. At this and in all the other mines belonging to the company, are efficient washing and pumping machines, driven by steam engines, twelve to fifteen in number.

"After dinner we visited the New Hartman Mine, and were left in charge of Captain Webb. We descended as in the other mine, and were astonished at the vast improvement over the other mine. (Old Hartman Mine). We were shown the different operations of mining and roofing, (always a serious problem) which were very interesting to us. Many veins of sulphide of zinc, which is considered the best quality of zinc found, were shown to us. The company own in fee simple about 500 acres of land, besides the mineral rights of other lots adjoining their land, embracing the entire range from the top of the mountain to the village of Friedensville, which place is greatly improved since the discovery



Eugene W. Blank, Photo (1931)

A view of the old Ueberroth Zinc Mine. The ruin on the right is the engine house

of the mines. There are a workingman's store, a reading room and library, a new Methodist Church, and many other new buildings."

This account, although only given by me in part, will serve to give one an idea of the impression which these operations made on the outsider. The people in Bethlehem had great hopes for these zinc mines. Visions of zinc all over the valley were common, and speculating was rife as the mines progressed, up to the seventies. That the zinc mined there was of a high grade and pure type there is no doubt. To quote, this time from the Engineer and Mining Journal:

"Lehigh zinc, or spelter, made from the ores of the Friedensville mines, near Bethlehem, Pa., has a world-wide reputation as the purest zinc in the world, and has been especially adapted for use in cartridge making; in fact it is the only zinc yet known (1886) that will make a cartridge that will never expand nor stick in the gun when firing. The Russian and Turkish governments have long recognized this fact, and during their last war had expert commissions in this country testing the metal made into cartridges for them, and they even brought over ores from other countries to treat here in order to determine whether it was due to any special treatment here. It was fully demonstrated that Lehigh zinc is better than any other, because the ore is purer, containing neither arsenic nor lead, and that, with lake copper, it formed the best cartridge metal yet made. Other European nations have recognized the same fact by buying here; but the English government with its accustomed 'deliberateness' could not accept this fact without expensive experience of its own. Fortunately this experience came in a little war instead of a great war. In the Sudan campaign it is said to appear beyond doubt from evidence collected by Lord Charles Beresford, that in action with the Arabs, 25% of the rifles were at one time useless by the jamming of the Boxer cartridge, and this no doubt greatly increased the losses of the British, and lacked but little towards annihilating the band of heroes who fought their way forward in the vain effort to rescue General Gordon. It has at last attracted the attention of the government, and a contract has been made for a large amount of the Bergen Point Company's Lehigh spelter, with with the new cartridges are being made. The price paid is 8½ cents a pound." (at the time this article was written the Bergen Point Zinc Co. was in complete control of the Friedensville mines).

Pure as the finished product was however, both the oxidized and the sulphide ores were mixed with impurities when they were first taken from the mines. This meant that before the ores were sent to the furnaces, concentration was necessary. In the calamine and smithsonite the impurities were for the most part clay and small pieces of limestone, with tiny pieces of pyrite and sphalerite. It was this pyrite that caused old Jacob Uberroth to imagine the ore was gold when he first took it to Mr. Roepper for analysis.

As the oxidized ores were brought up from the mines, the larger pieces were broken by sledges, and then the impurities were picked out by hand, and the ore sent on to the spelter works. The smaller fragments mixed with clay were passed through washers, from which the ore was discharged through screens and thrown on tables, where the impurities were picked out by boys.

The water from the washers, carrying the clay with small bits of ore, was drained into ponds, and later much of the coarser material which had been deposited in this way at the inlets to the ponds, was recovered by draining the water, and considerable quantities of ore were thus recovered by rewashing. This merely shows the careful economy of the day. Efficiency experts would have had little waste to find, had any attempted to look for it.

The intimate mixture of impurities in the ore rendered concentration somewhat difficult. Often the clean product was obtained only by extremely fine grinding. The result was that during the period of the most active operations, the richer ore was picked by hand, and sent at once to the furnace: The remainder was laid aside for future attention.

(To Be Continued)

A Recent Visit to Maine

By C. W. HOADLEY

One hot summer day last August we felt we could stand the climate of Hartford, Ct. no longer, consequently. I was not surprised when my wife suggested a visit to Maine in our old faithful coupe.

Our trip led through the Connecticut Valley as far as Claremont, N. H., where we had decided to spend the night, but due to a decidedly noisy town clock, our itinery was changed to the extent of proceeding to Lake Sunapee where we discovered a little old fashioned New England tavern with a large anchor in the front yard; possibly it was the anchor that suggested a safe anchorage, sufficient to say, we slept the sleep of the just and were well fortified for our next day's run.

Eventually we reached Paris Hill, Oxford County, Maine, which was intended to be our destination for a few days. It is now five years since the writer first went to Paris Hill, and changes occur even up in Maine to disturb the placid life of the inhabitants of that interesting State. My good friends, who had harbored me on my last visit, informed me with great regret, they could take no one in as boarders, as certain laws had recently been enacted by the State Legislature requiring a license, if summer boarders were entertained in their home. This, naturally, being contrary to the independent spirit of New England, met with little favor on their part—and in this respect the writer feels in absolute sympathy.

The day after our arrival we donned our most delapidated clothes and proceeded forthwith to hunt for the elusive garnet, tourmaline or whatever was to be found. Our first visit was to the Buckfield locality known as "Bennett's Ledge," located about six miles from Paris Hill. A short walk of about half-a-mile brought us to the quarry which had been abandoned for some time. This locality is a typical pegmatite dike which evidently had been partially worked out. The quarry itself is a cut extending about one hundred feet into the vein which is about seventy-five feet wide. This quarry was famous when it was in operation for the enormous quartz crystals which was taken from it: Beryl, Columbite, and Cassiterite were prominent at the time when the work was in operation. Rhodocrosite also was found at this locality and very beautiful Lepidolite which formed as a crust on the walls of pockets. I think this particular occurrence of Lepidolite was unique when first found. The shell-like crusts, not being over a quarter of an inch in thickness, were translucent and when held against transmitted light showed a beautiful rose-lavender color. The best find at this locality was not actually in the quarry itself, but in a small pile of milky quartz about one hundred yards away, where a number of fine specimens of bluish beryl were collected.

The Mount Mica locality has been described by so many people in the past that the writer feels it unnecessary to go into any description, except to say that the quarry is now completely abandoned and has not produced any tourmalines for a great many years. A few scattered blocks of Lepidolite was the only mineral of interest in evidence.

Mr. Arthur Valley of Paris Hill has a very fine representative collection of tourmalines together with a fine general local collection from the localities in the vicinity. Mr. Bickford in Norway is ever on the alert to acquire specimens from the many Feldspar workings throughout Oxford County.

The writer thinks that the people of Maine should be justly proud of having such an intelligent interest displayed in the mineral resources of the State.

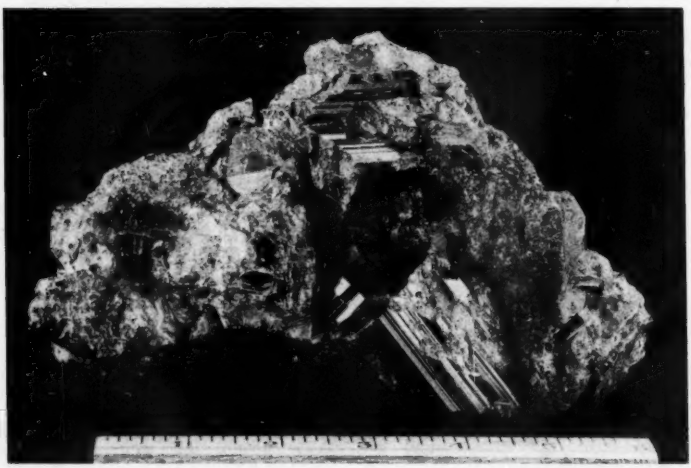
The Mount Mica tourmaline mine is not the only locality in the immediate vicinity of Paris Hill. Within a radius of two or three miles are several other localities: "Hoopers Ledge" was visited by the writer, where brown

lumps of apatite are intermingled with the Feldspar; Muscovite, Black Tourmaline, Garnet and interesting quartz crystals were collected at this place. About a mile away from "Hoopers Ledge" is an abandoned working which has been recently used as a convenient place to dump rubbish. Large masses of foliated mica exist in this quarry, which has been very much weathered and altered as well as having been impregnated with limonite, which was produced from either garnets or black tourmalines in its immediate proximity. This led the writer to think that some excavation in this material might prove of interest, and he was not disappointed when Mrs. Hoadley produced a garnet as large as a billiard ball, but decidedly weathered on the surface. This specimen, was hanging around the house for a number of months when one day a discovery was made—which proves the old saying that "four eyes are better than two." On the surface of this garnet was found an almost perfect Chrysoberyl showing all the faces and exhibiting interesting twinning. The color is yellowish green, having a hardness of 8½ and showing the typical feather like striation as shown in Dana's text book. (Figure 713). As Chrysoberyl has not been reported, as far as the writer is aware, from Paris Hill or Mount Mica, he feels it only right that this should be put on record as having been found by Mrs. Charles W. Hoadley.

A good collecting spot was visited by the writer near the north end of Norway Lake and not very far from the "Old Noyes Quarry," where very interesting distorted quartz crystals were found, associated with clusters of small apatite crystals of a very delicate shade of lavender.

About a mile south of the village of Norway on the state road to Portland is a granite quarry, in which can be found small but perfect crystals of muscovite—the crystals averaging 1" x 2" and sometimes 3" long. The quality of this mica is the finest the writer has ever seen, and make most attractive cabinet specimens when partially imbedded in the typical gray quartz which cut the granite in veins from 4" to 8" thick.

The writer wishes to thank Mr. Valley of Paris Hill, Maine, for his kindness on the occasion of his visit, as an acting guide.



Courtesy of MAINE MINERALS

Vesuvianite Crystals in Massive Vesuvianite, Sanford, Maine.
From the Collection of Isaac S. Skillin, Freeport, Maine
Specimens from this locality are to be found in almost every museum in the world. The locality has produced some of the very finest vesuvianite crystals for size and perfection.

Diamond Finds In The United States

By EUGENE W. BLANK, *Scientific Editor "Rocks and Minerals"*
Colgate-Palmolive-Peet Company, Jersey City, N. J.

PART VI.

APPENDIX

Since the beginning of the publication of this paper Mr. Frank B. Wade, Head of the Department of Chemistry of the Shortridge High School, Indianapolis, Indiana has called my attention to several references bearing on diamonds in Indiana and Illinois [1] [2] [3] [4]

In addition Mr. Wade has described several specimens of diamond from Indiana in his collection. His letter is of such interest I quote it at length:

"I have found one small diamond myself in a tributary of Gold Creek, Morgan County, Indiana. It was a tiny dodecahedron no larger than a grain of sand. I have personally seen at least seven others. Two were in the possession of a Dr. Kelso of Mooresville, Indiana, which he assured me he found himself in Morgan County. One of these was of 5/8 carats, the other of 1/8 carat. Both stones were of a fine white color. Dr. Kelso told me he had found a third stone which he did not have by him at the time. The Doctor had panned many times, mostly in Gold Creek, Morgan County. He had in his possession some $150 worth of gold which he had panned out and also a piece of what I identified as chlorastrolite which he had found in Gold Creek; a most significant find, as this mineral is found, so far as I know, in situ, only on Isle Royal at the west end of Lake Superior, giving us confirmation of Hobb's theory of the origin of the diamond in the Wisconsin drift up towards Hudson's Bay. I have found virgin copper in the drift in Western Indiana indicating a similiar back track through the Superior country.

"I once saw a cut diamond of 7/8 carat which was one of two halves cut from a Brown County stone. Dr. Blatchley, when State Geologist, purchased from a Brown County gold miner a rough diamond of about 1.05 carats which I saw. It was a bit yellowish in appearance but I suspected that the color was superficial. I once saw a fine blue white cut stone of over two carats in the possession of a Morgan County gentleman who assured me

Fig. I.

Panning for diamonds in Salt Creek, Brown County, Indiana.

(Mr. Wade is operating the pan)

1 Sterrett, "The Production of Gems and Precious Stones in 1909," Dept. of Interior Publication, p. 26 (1909).

2 Ibid., p. 16 (1911). Describes Illinois finds.

3 Ibid., p. 21 (1912)

4 Ibid., (1913).

he had had it cut from a rough stone from that county.

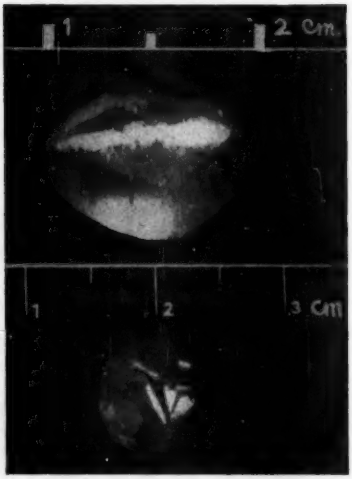


Fig. II.

Top—Brown County, Indiana diamond of 3.08 carats
Bottom—Morgan County, Indiana diamond of 3.64 carats

"I own a marquise cut diamond of 1.33 carats which I had cut from a stone of 3.08 carats which I purchased from a gold panner of Brown County, Indiana. It was an elongated, flattened crystal. (See Fig. II—top section) with 24 principal curved facets and with an ingrowth on one of the flattened sides (not shown in the photograph) which required the removal of an unusually large amount of material during the cutting, leaving a rather too flat and low top on the finished stone. The color is not good, the stone being a "silver cape" or slightly yellowish. It is practically perfect in crystallization.

"Another stone which I own I purchased from a Morgan County gold panner. It is a roundish, flattened crystal of very complicated form (see Fig. II bottom.) The weight is 3.63 carats. The color is slightly yellowish. There is a dark speck inside of it and a tiny crack or two. It would lose at least one half its present weight in cutting and would yield only a slightly imperfect stone of too wide a spread. I shall probably leave it uncut as a specimen. It shows a little wear like most "river" stones. The other crystal showed considerable wear."

U. S. Civil Service Opportunities

For those who are interested we are pleased to announce the following open competitive examination to be held in the near future by the U. S. Civil Service Commission:

Assistant Mineral Economist, $2,600 a year. Applications for the above examination must be on file with the Commission at Washington, D. C., not later than April 1st, 1935.

The examination is to fill a vacancy in the Bureau of Mines, Department of the Interior.

Full information may be obtained from the U. S. Civil Service Commission, Washington, D. C.

Ceylon, The Island of Gems

By JONATHAN McCOLLUM BLAIR

In Ceylon are found most of the gems, with the exception of diamond, emerald, opal, and peridot. The principal gems occurring there are as follows:

Adularia-moonstone: almost transparent colorless, with a white or bluish schillerescence.

Alexandrite: fine examples are diurnal pistachio-green, nocturnal rich mulberry-red. Ceylon is the chief source of alexandrites, but the most choice specimens are from Siberia.

Aquamarine: sea--green, sky-blue.

Chrysoberyl: attractive, although its beauty is somewhat unappreciated. Shades of autumn-green, brown, and yellow. Possesses great brilliancy.

Cymophane: (cat's-eye chrysoberyl) only found in Ceylon and Siam. The rarest and most curious of all precious stones are cymophanes which change from green to red, as do alexandrites. Ordinary cymophanes do not possess this diurnal-nocturnal pleochroism. They are better called cat's-eye alexandrites.

Garnet: Red, violet, cinnamon, brown.

Iolite.

Ruby: Ruby-red to delicate rose-pink.

Star Ruby: Also found in Burma.

Sapphire: Golden-orange to primrose; royal-sapphire to sky-blue; plum to violet and lilac.

Patparagum sapphire: Rich salmon-pink, resembling the tint of the "Sunrise" rose. Most attractive.

Green sapphire: very rare in Ceylon, but fairly plentiful at Mt. Anakie, Queensland. At Anakie, however, the red and purple are entirely absent.

Star Sapphire: found almost exclusively in Ceylon. Bronze-colored ones are found at Ellijay, Macon Co., N. C.

Spinel: extensive color range, except that yellow is missing. One of the three singly-refractive gems, the other two being diamond and garnet.

Sapphire spinel: spinels that somewhat resemble sapphire.

Ruby spinel: Spinels that somewhat resemble rubies.

Flame spinel: remarkable flame-red. Color unique in the whole mineral world, not even excepting the ruby. An exquisite gem of great value.

Topaz: Colorless, blue.

Star topaz (asteriated yellow sapphire) exceedingly rare. The various star stones are highly valued by connoisseurs when of choice quality. Green sapphires do not exhibit asterism.

Tourmaline: Red, claret, yellow, green, blue.

Zircon: Colorless, shades of soft yellow, green, cinnamon and brown. Strangely unappreciated. Coloring most pleasing. Brilliancy second only to that of the diamond. Dispersion approaches in some cases to that of the diamond. Comparatively inexpensive.

The entire trade is controlled locally by Moormen, many of whom are extremely wealthy. No foreigner is admitted within the magic circle of the Moormen except as a customer. The Moormen are descendents of the Moors who once occupied Ceylon, and of

whose forts large ruins still exist in the island.

The value of the precious stones annually exported to Europe and America from Ceylon is estimated at 15 million dollars.

The gem-stones are of igneous origin, and have been loosened from the granite and gneissic rocks in which they were formed by disintegration. They are found in a stratum of alluvial gravel, which is reached by digging pits 3-30 ft. deep. They are generally in the form of more or less water-worn nodules, undamaged crystals being very rare.

The searching for gems is carried on from October to March.

The placer residue contains thorianite, thorite, and other heavy minerals.

There are several extensive districts in the island where precious stones occur, but the most productive locality is the hilly country of Saffragan, the chief town of which is Ratnapura (the City of the Rubies).

Nearly all the different kinds of gems are found occurring together, the exceptions being alexandrite, amethyst, moonstone; which are principally derived from Galle.

Some other gems not already mentioned occurring in Ceylon are: Chrysolite, colorless sapphire, almandite, essonite, cat's-eye quartz, rose quartz, and smoky quartz.

An Occurrence of Yellow Sphalerite in Mascot, Tenn.

By WM. C. McKINLEY

One usually thinks of sphalerite occurring in shades of black, or brown, but less often in yellow. The author has in his possession a fine specimen of rich zinc ore from the well-known Mascot locality, in Tennessee; it is highly crystalline, in appearance somewhat foliated to coarsely granular, and all intimated with white dolomite. At a first casual inspection, this specimen would appear to be damourite—due to the light reflections from the crystalline sphalerite, but upon closer examination, by the touch of the fingernail especially, its true identification would be arrived at; together with chemical analysis.

The whole ore bed at Mascot rests in highly crystalline dolomite. Accessory minerals are: smithsonite and calamine, both alteration products, and calcite and some barite. Minute isolated grains of pyrite are disseminated throughout the country rock. The main ore, sphalerite, is more abundant in the contact zone, with promiscuous occurrences of it within the country rock as veinlets, openings, etc.

The paragenesis of the formation may be outlined as follows:[1]

1. Country rock.
2. Dolomite (Knox).
3. Sphalerite.
4. Pyrite.
5. Dolomite (when present).

An analysis of the country rocks shows iron to be present to only 3.48%; thus one can understand the cause of the light yellow color of this sphalerite, which does not, therefore contain the high amount of iron which is the reason for the usual brown and black shades, such as are found in the Joplin, Mo., locality.

1 Secrist: "Zinc Deposits of East Tennessee," Division of Geology, Bulletin 31, Nashville, Tenn., 1924.

Accident or Chance

DID ANYTHING LIKE THIS HAPPEN TO YOU?

A gentleman residing in Peekskill, in whom in later life a love of mineralogy had been reawakened, was riding with a friend one day when they passed the Tilly Foster iron mine. "There," said the gentleman, "is a locality I have wanted to look over." "Why not now?" said his friend, "I'll wait for you." The gentleman got out, started across a level stretch toward the inclined side of one of the dumps, with no thought of finding anything and suddenly saw in his way a fine clear specimen of brucite. Not wishing to keep his friend waiting, he gave the dump a cursory glance, and returned to the car. But by purest chance he found one of those fine specimens always to be cherished as a veritable prize.

A trap rock quarry supposedly barren of minerals was visited by Mr. Louis Reamer as related in an article in the December, 1929 issue of ROCKS and MINERALS on the chance that the formation of rock indicating remains of a volcanic action might be worthy of observation at least. Disturbing a wasp's nest and brushing away some leaves where they had established their home, he discovered a small fragment resembling an agate. Searching further he uncovered 17 samples of blue-banded agate. Conferring later with the owner of the quarry, he learned that this was the first the owner knew of any minerals in the quarry.

Louis Reamer, Photo (1929)

Spottiswoode—Cusack Quarry (a trap rock quarry on Walker Road, Orange, N. J., where Mr. Reamer made his interesting discovery.)

The Amateur Lapidary

Conducted by J. H. HOWARD*

504 Crescent Ave., Greenville, S. C.

Amateur and professional lapidaries are cordially invited to submit contributions and so make this department of interest to all.

*Author of—*The Working of Semi-Precious Stones.* A practical guide-book written in non-technical language for those who desire to cut and polish semi-precious stones.

Lapidary Chats

The advanced amateur lapidary is likely to forget many of the problems which confronted him in his early days, so that, he usually gives only general directions, leaving to the beginner the working out of many of the details for himself. Even when this is accomplished, the amateur, as yet lacking experience, often wonders how others undertake the same work, and if he is pursuing the easiest and best methods.

Therefore, the following miscellaneous notes may help him or satisfy the curiosity of other lapidaries, as to how the writer has solved certain problems.

In order to cut and polish long faces, as on the step cuts of long gems, it is essential that the laps shall be flat, if the edges of the faces are to be parallel. A cast iron lap acquires a very hard surface and, if machined on a lathe, it is necessary to take quite a deep cut. The writer finds it easier to grind all laps, (tin, bronze or cast iron) in order to remove the hard worked surface, and to smooth on a large flat disc with 150 carborundum. The lap to be ground is mounted on a heavy grinding head and run at about 500 revolutions per minute. A carborundum wheel, such as is used for fine grinding, is mounted on a small grinding head. This is held in the hands with the base resting on the bench and is pressed against the lap. The grinding wheel should be allowed to revolve. If the axes of the two shafts do not coincide, the relative motion will be such that cutting will take place. If the grinding wheel is moved continually over the lap, there is little danger of cutting grooves.

Galvanized iron makes better splash pans than tin, as the galvanized iron does not rust as readily. However, many amateurs are not equipped to handle anything but light tin. If tin splash pans or guards are given a coat of good enamel, they will last much longer and look much better.

The chemical profession has a cement for mending broken laboratory equipment which is excellent for mounting small gems on the lap stick. It is called DeKotniski and is priced at approximately 75 cents per stick. It is particularly useful for mounting gems when the table is against the lap stick, as it takes very little to make a good bond and is translucent enough to assist in getting the gems set right.

Nearly every article on gem optics calls attention to the desirability of keeping all rear facets within the critical angle in order to avoid a "hole" in the finished gem. If light citrine is cut very flat and is mounted in jewelry with the bezel open in the back, it will take on the color of costumes in red or yellow and be very effective. A square gem with step cut will be particularly interesting this way.

Many drawings of brilliant cut gems show the main facets coming to a point exactly at the girdle. If the gem is to be mounted in a Tiffany setting this is right. If the gem is to be set in a bezel, the bezel will cover the points of the facets, unless the points of the main facets are a little distance from

the girdle. In fact, in such cases, it is better to have the points too short than too long.

The writer has recently added a micrometer adjustment to both the vertical angle adjustment and the index. They are certainly worth while, particularly to correct for the lack of parallelism in long step cuts and to adjust for error in resetting gems which have come off the lap stick during the polishing operation.

The writer uses sections of sectional binder posts, which are supplied with certain types of loose leaf ledgers, as tips for the end of the rod in his index head. These are one inch long and three-eighths of an inch in diameter with a male and female thread. The male end screws into the rod or lap stick and a short bolt is screwed into the other end. The gem is mounted on this bolt.

The first advantage is that the tip may be screwed into a firm seat without use of a lock nut. The second advantage is that a number of gems may be mounted at one time for any operation. By having a rod similar to the one in the index head, it is not necessary to use the index rod or lapstick to square up the gems.

It is the writer's custom to cut a number of gems at one sitting and then polish them. The tips unscrew readily and when replaced will register exactly, if a little care is taken, however, with the micrometer adjustments it is not necessary to worry about exact register.

The orientation of the back of a gem, so that the cutting will coincide exactly with the front faces, is a problem which is probably solved in a different manner by every lapidary . It is the writer's custom to cut one or more extra facets on gems, which have sufficient excess material to allow it. It is then much easier to match the cut with these extra facets.

When this procedure is not possible and the gem is so small that it is difficult or impossible to see enough of the finished portion to get good orientation, it is possible to do so by using a square which, when set on the lap stick, will have an edge perpendicular to the axis of the stick.

If a facet on the back of a gem is oriented with respect to a facet on the front then their intersection at the girdle will be perpendicular to the axis. By testing the line of intersection, as soon as it appears in cutting, it is possible to get very close orientation with a square of this character.

The writer had considerable trouble with vibration in his lapidary bench when it was first set up. In spite of careful machining, the vibration was excessive due to the fact that the period of vibration of the bench was the same as the period of vibration of the revolving lap. The first step in an attempt to improve the machine was to build the table top, on which the index mechanism set, entirely separate from the framework holding the motor and machinery. This stopped all vibration in the index head. Lately the machine frame has been bolted to the cement floor and all vibration has been eliminated.

In connection with changing speeds between motor and lineshaft, the beginner's method is usually to arrange the motor so that it will slide, in order to take up the difference in the length of belt required. If the motor is mounted on a heavily hinged board, then the belts may be shifted from large pulleys to small with minimum of effort. A rod and clamp may be installed to regulate the pull on the belts.

A design of tweezers called "soldering tweezers" are very convenient for handling gems. These are the kind that are self-closing and open under pressure. If these tweezers are not provided with groozes lengthwise of the points, they should be filed in. The girdle of the gem is placed in this groove and slipping is avoided.

Highly colored gems, such as amethyst, citrine, and topaz, may be cut for color rather than sparkle by cutting the table cabochon and six girdle facets, at about 40°, on top. The bottom should have six sets of step cuts oriented with the top girdle facets. There should be as many step cuts as it is practical to make but be sure that the last facets are within the critical angle. Such a gem will have little or no glitter but will be rich in color.

Transparent opal or Mexican opal are very attractive in this shape but the writer wishes someone would tell him how to polish facets on opal.

ARTHUR KNAPP,
1401 Arch St., Philadelphia, Pa.

Collector's Kinks

Collectors are cordially invited to submit notes from their experiences and so make this department of interest to all.

Certain minerals and especially stones of the quartz group that would ordinarily be transparent or translucent, after weathering become scratched and have a very dull appearance which also reduces their transparency. If these are first washed in clear water and scrubbed with a hard bristle brush to remove all dirt and then given a light coat of white shellac, they resume their transparency. For those not equipped to polish their specimens, this is a very simple method of producing a nice appearance. This should of course not be applied to porous or very delicate fibers. If very delicate crystals, etc. need the shellac treatment, they should be dipped and drained to remove the excess.

Denver, Colo. C. W. REITSCH

Mineral Oddities

In the substrata of Jerusalem in Palestine is a thin bed of hard siliceous chalk, termed locally Misse, overlying a thick bed of white limestone known as Meleke. Both stratas are good for building but the Meleke is so soft that tombs, tanks, cisterns and tunnels were dug in it. In the temple area alone, thirty-four cisterns have been found, one of which (over an acre in area) would hold two million gallons of water. The two ancient aqueducts from Bethlehem district entered Jerusalem underground through the Meleke. The very ancient tunnel and stairway from the temple area down to the large spring northeast of the city contains on its walls the oldest Jewish inscription ever found in modern times.

A similar sort of stone, soft when quarried and hard upon exposure, is found in the south Sinai Peninsula. While the exact location of the "Mountain of the Law" is not definitely known, the fact that such a stone outcrops in various places, will afford to those who seek explanation for Biblical miracles, the plausible theory that Moses fabricated the two stones bearing the Ten Commandments which stones hardened before being displayed to his people.

CAPT. H. E. MITCHELL

Long Beach, Calif.

MINERALOGY QUIZ

(Answers on Page 48)

1. What is flint?
2. What is it composed of?
3. What is its color? Its hardness?
4. In what formation is flint commonly found?
5. Name an important locality for flint?
6. Name one important use to which flint was put to ages ago?
7. Name one important use for flint today?

Club and Society Notes

Canon City Geology Club

"Over the top" is the slogan of this hobby group of Canon City High School, Canon City, Colorado. They meet every other Tuesday morning with lunches and smiles for a trip to the hills. No precipice, however formidable, daunts them. Even the sky, line itself must yield to their proclivities in mountain climbing and all is done without hook and ladder or Alpine rope.

But mountain climbing is not the sole object of the club. Each one has a lot of mineral specimens, pretty rocks and fossils that each member is collecting for laboratory purposes. When the season closes these public spirited youngsters will place their best specimens on display in the Municipal Museum in order to exhibit Fremont County's mineral resources to the tourists and amateur prospectors who might want to know what such minerals as feldspar, fireclay, oilshale and Colorado Supreme Granite look like. Some may be interested in historical geology and wish to see specimens of Cretaceous plant life, dinosaur bones and cephalopods that lived in the vicinity ages and ages ago; if so, the museum will have exactly what they want, with every entry classified, labeled and identified.

In Colorado, there are truly "Sermons in stones" and this group goes out into the fastnesses on school days to get the message. The club was organized in 1931. The present membership is 19. Bill Lindsey is president and Martha Rose, secretary.

F. C. KESSLER, Sponsor

Mineralogical Society of Springfield (Vermont)

Harold L. Chandler was elected president of the Mineralogical Society of Springfield at the first annual meeting of the society, held January 16th, at the home of E. N. Brookings. The other officers are: Vice-president, R. J. Lyon; treasurer, E. N. Brookings and secretary, F. L. Parmenter.

During the meeting an interesting and instructive paper on the history, age and occurrence of pebbles was read by J. M. Pierce. The society voted to stimulate interest and action in furthering the work of the State Geological Survey, which is a vital activity promoting the efficient use of the natural resources of the State of Vermont.

Amateur Geologists Association (Chicago, Ill.)

Formerly known as the Chicago Chapter of the Rocks and Minerals Association, the Society was reorganized at the beginning of the present year. It prepared a new charter, elected new officers, and even a new name was adopted. Meetings are to be held regularly on the second Saturday of each month. The initiation fee is only 25c and annual dues are $1.00. Mr. Frederick Shepherd, 601 E. 102nd St., Chicago, Ill., is Chairman of the new Society.

Reader's Section

Editor "R & M":

I was very happy to learn that the committee had accepted my sketch as being the most appropriate for the design of the official association pin and wish to extend to them my many thanks.

The specimen of Iridescent Obsidian is very interesting as it is the only specimen of that variety in my collection.

ARTHUR A. GROTT,
Feb. 2, 1935 New York, N. Y.

Editor "R. & M."

In the January issue of ROCKS and MINERALS, mention is made on page 16 of U. S. Geological Survey Bulletin 624. We have written the Director, urging that another edition be printed.

F. L. PARMENTER, Secy.
Mineralogical Society of Springfield,
Jan. 28, 1935 (Vermont)

Editor "R. & M."

I would be pleased to see a little article on salt mining. Can you not induce someone to prepare such an article?

G. F. WOLTER,
Feb. 12, 1935 Chicago, Ill.

Acknowledgments

We wish to acknowledge receipt and express our sincere thanks for specimens and other donations recently sent us by some of our subscribers.

Capt. H. E. Mitchell, Long Beach, Calif., a fine specimen of a choice crystallized barite from California.

Jas. W. Wilt, Taft, Calif., three interesting minerals from his locality.

John Fox, Trona, Calif., four excellent Hanksite crystals from Trona, having quartzoid forms.

Herman Wuestner, Cincinnati, Ohio, six choice mineral specimens from various localities visited by him.

Geo. Barclay, Newport News, Va., a very fine specimen of native gold in quartz from his mine in North Carolina, and also an interesting collection of fossils from Virginia.

MINERALOGY QUIZ—Answers

(Questions on Page 46)

1. A dense fine grained variety of quartz which is very tough and breaks with a conchoidal fracture with sharp cutting edges.
2. Consists largely of remains of diatoms, sponges, other sea plants and wee creatures which on dying, had fallen to the bottom of the sea, accumulating in vast deposits, to form the flint nodules we know today.
3. Gray or shades of gray. Hardness is 7.
4. Chalk, a white friable limestone.
5. Chalk cliffs of Dover, England.
6. Used by primitive people for various implements as knives and arrowheads, etc.
7. Flint pebbles are used commercially for grinding various minerals, etc., into powder.